

2003 *Spartina* Control Water Quality Monitoring

Introduction

Water quality monitoring was conducted, in Grays Harbor, Willapa Bay, and Puget Sound, to detect the presence of glyphosate (AquamasterTM, Monsanto Company or RodeoTM, Dow AgroSciences, LLC) adjacent to locations where *Spartina* control activities were conducted. The monitoring activities, conducted by Washington State Department of Agriculture (WSDA), met the first year monitoring requirement of the Aquatic Noxious Weed Control National Pollution Discharge Elimination System Waste Discharge General Permit, WAG 993-000 (NPDES) *Spartina* section.

The purpose of monitoring was to record glyphosate concentrations in the effected water bodies subsequent to the treatments by different herbicide application modalities utilized for control of certain infestation types. The application/infestation matrices are shown in Table 1. Samples were captured after the first high tide, succeeding the final treatment for the season, passed over the site.

Table 1. Applications used for differing infestation types

Sample Location	Application Type	Infestation Type
Leque Island, Puget Sound	Ground Broadcast	Meadow
Livingston Bay, Puget Sound	Hand Held	Scattered Regrowth
Rose Ranch, Willapa Bay	High Volume	Clone Field
North Pot Shot, Willapa Bay	Precision Broadcast	Meadow
North Bay Ave., Grays Harbor	Backpack	Seedlings
North Willapa Bay*	Aerial	Meadow

* Post-treatment only. No aerial treatments were expected when monitoring plan was written. Timing of treatment did not allow for WSDA personnel to collect pre-treatment sample.

Pre-treatment samples were also collected at each site at least 12 hours before the first glyphosate application of the season for the waterbody. Pre-treatment sampling was conducted to identify if any sites had pre-existing levels of glyphosate in the water column. All of these samples were returned negative for the presence of glyphosate.

The pre-treatment sampling took place at locations that were considered to be areas where the post-treatment samples, that would exhibit results that were representative of the entire site, would be collected. WSDA personnel were able to collect post-treatment samples at the same location at the Livingston Bay, North Bay, and North Potshot sites. All other post-treatment sampling occurred as close to the pre-treatment sampling as allowed by safety concerns.

Treatments

Spartina treatments occurred between June 2 and October 30, 2003. All treatments were conducted by applicators licensed by WSDA using any of the application types listed in Table 1. Private landowners, United States Fish and Wildlife Service, WA State Department of Fish and Wildlife, WA Department of Natural Resources, WSDA, and

county personnel, from Island, Skagit, and Snohomish Counties, made applications. The broadcast applications were made with a maximum of 2% glyphosate tank mix, while handheld applications were applied at up to 8% glyphosate.

A total of over 5000 acres were treated with glyphosate employing an integrated approach. The different control programs made mixed use of integrated vegetation management (IVM) strategies; including chemical, mechanical, manual, and biological control approaches.

Sites

All post-treatment sampling occurred in a shoreward location of the treatment area with the exception of the North Potshot site. North Potshot was only accessible by boat. The sampling location was in the interior of the treated meadow in an area safely accessible by airboat. A private operator whose vessel was never used in glyphosate applications provided airboat transportation, thus minimizing the possibility of sample contamination.

Sample Handling

All samples were collected during the subsequent high tide after the completion of treating the entire site. Water depth at sampling stations ranged from 6 inches to approximately 5 feet. Samples were sent to the lab on ice, via overnight courier. The samples were occasionally stored overnight in a cooler inside a refrigerator before being shipped the next morning. This delay was incurred because of the variable timing of sampling did not allow for immediate shipping. A Washington State Department of Ecology accredited laboratory using the method, EPA 547, analyzed all samples.

Efficacy

Some efficacy surveys were conducted during the treatment season. These mainly focused on the amount of “brown down” and new shoot development exhibited in the areas receiving trial treatments. The nature of the reaction of *Spartina* to glyphosate treatments makes complete, same season surveys nearly futile. The plants turn brown to the ground, but the bulk of the roots may be unaffected. This sizeable amount of root mass beneath the surface will, a majority of the time, send up shoots the next growing season that were imperceptible the prior season.

Summary of Glyphosate Presence

All glyphosate samples were well below the EPA drinking water standard of 700 ppb by the time samples were collected during the next high tide cycle except for the Rose Ranch site. With the amount of herbicide expended at Rose Ranch, it was expected that the detection level would be in the low to mid-range as compared to the other sites. With no known upland glyphosate applications in the area, the high readings may be accountable to either runoff from Caruthers Slough, an illegal glyphosate application, or

laboratory error. Similar sampling at Rose Ranch will occur next year to check if this was an anomaly.

Treatment Site: Leque Island (approximately 67.95 acres treated)

Sample 1	Sample 2
31 ppb	21 ppb

Treatment Site: Livingston Bay (approximately 24.5 acres treated)

Sample 1	Sample 2
150 ppb	150 ppb

Treatment Site: Rose Ranch (approximately 0.55 acres treated)

Sample 1	Sample 2
2600 ppb	2600 ppb

Treatment Site: North Potshot (approximately 83.3 acres treated)

Sample 1	Sample 2
19 ppb	18 ppb

Treatment Site: North Bay Ave. (approximately 0.13 acres treated)

Sample 1	Sample 2
ND (equipment blank)	320 ppb

Treatment Site: North Bay Aerial (approximately 200 acres treated)

Sample 1	Sample 2
140 ppb	180 ppb